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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/591,475	09/01/2006	Mitsuo Takashima	295882US0X PCT	1462

22850 7590 11/29/2010

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EXAMINER	
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ART UNIT	PAPER NUMBER
1733	

NOTIFICATION DATE	DELIVERY MODE
11/29/2010	ELECTRONIC

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/591,475
Filing Date: September 01, 2006
Appellant(s): TAKASHIMA ET AL.

Richard L. Treanor and Jeffrey B. McIntyre
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed November 8th, 2010 appealing from the Office action mailed June 4th, 2010.

(1) Real Party in Interest

The examiner has no comment on the statement of the real party in interest.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 1-18

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal:

JP 2000-337334 A1 (Full English Translation)	**NAMIMURA**	**December 5th, 2000**
US 2002/0179207 A1	**KOIKE**	**December 5th, 2002**
JP 59-226116 A1 (Full English Translation)	**HIJIKATA**	**December 19th, 1984**
US 3,677,829	**STEFAYNE**	**July 18th, 1972**

(9) Grounds of Rejection

The following grounds of rejection are applicable to the appealed claims:

Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Namimura** (JP 2000-337334 – Full English Translation) in view of *any one of* **Koike** (US 2002/0179207 A1), **Hijikata** (JP 59-226116 – Full English Translation), or **Stefayne** (US 3,677,829).

Namimura

Namimura is drawn (Abstract) to a high-strength bolt with excellent resistance to delayed fracture and a tensile strength of over 1200 N/mm^2, features a microstructure of

more than 80 area% pearlite with the remainder being proeutectoid ferrite, free cementite, bainite, and martensite at less than 20 area% (para 0012).

The contents of C (para 0016), Si (para 0018), Mn (para 0021), P (para 0029), S (para 0030), Al (para 0025), Cr (para 0020), Co (para 0019), Ni (para 0023), Cu (para 0022), Mo+V+Nb+Ti+W (para 0024), B (para 0026), and Fe (para 0028) are shown in the comparative table below:

Elements	Namimura	Instant Claims 1,15	Overlap
C	0.5 – 1.0	0.5 – 1	0.5 – 1
Si	(0) – 2.0	1 – 3	1 – 2.0
Mn	0.2 – 1.0	0.2 – 2	0.2 – 1.0
P	(0) – 0.03	(0) – 0.03	(0) – 0.03
S	(0) – 0.03	(0) – 0.03	(0) – 0.03
Al	0.01 – 0.05	(0) – 0.03	0.01 – 0.03
Cr	(0) – 1.0	0.51 – 2.5	0.51 – 1.0
Co	(0) – 0.5	(0) – 0.5	(0) – 0.5
Ni	(0) – 1.0	(0) – 1.0	(0) – 1.0
Cu	(0) – 0.5	(0) – 1.0	(0) – 0.5
Mo, V, Nb, Ti, W	Total: 0.01 – 0.5	Total: (0) – 0.50	Total: 0.01 – 0.5
B	0.0005 – 0.003	(0) – 0.003	0.0005 – 0.003
Fe	Balance	Balance	Balance

Namimura's bolt is formed by wire drawing, cutting to a predetermined length, warm-forging the head, and rolling the threads (para 0006-0007). Warm forging is used instead of cold forging because it is more difficult to form the bolt head by cold forging due to the very high strength of the wire rod (para 0040).

Namimura does not teach subjecting the bolt to a bluing treating in a temperature range of 100 to 500°C.

Koike:

Koike, like Namimura, is drawn to a high-strength bolt having excellent delayed fracture resistance and stress relaxation resistance with a tensile strength of over 1200 N/mm^2 (Abstract) and teaches producing a steel wire of the composition listed in the table below, with a total areal rate of pro-eutectoid ferrite, pro-eutectoid cementite, bainite, and martensite of less than 20% - with the remainder as pearlite (para 0008).

Elements	Koike	Namimura	Overlap
C	0.5 - 1	0.5 – 1.0	0.5 – 1.0
Si	0 < 0.5	(0) – 2.0	(0) – 0.5
Mn	0.2 – 1.0	0.2 – 1.0	0.2 – 1.0
P	0 < 0.03	(0) – 0.03	(0) – 0.03
S	0 < 0.03	(0) – 0.03	(0) – 0.03
Al	0.01 – 0.05	0.01 – 0.05	0.01 – 0.05
Cr	0 - 0.5	(0) – 1.0	0 – 0.5
Co	0 < 0.5	(0) – 0.5	0 – 0.5
Ni	0 < 1.0	(0) – 1.0	0 – 1.0

Cu	0 < 0.5	(0) – 0.5	0 – 0.5
Mo, V, Nb, Ti, W	0 - 0.3	Total: 0.01 – 0.5	0.01 – 0.3
B	n/a	0.0005 – 0.003	n/a
Fe	Balance	Balance	Balance

The steel wire is formed into a bolt by wire-drawing the steel (para 0015), cold heading the wire into a bolt shape (para 0021) and then bluing in the range of 100 – 400 °C to increase the bolt strength and improve the proof stress ratio and relaxation resistance (para 0020).

Koike does not teach the content of silicon in the instantly claimed range of 1 – 3 wt% but does teach that the beneficial effects of Si (improving hardenability, deoxidation, and solid-solution strengthening) all improve with increasing Si content, but at the expense of ductility (para 0026).

Thus Koike and Namimura both teach Si as a valuable element in terms of increasing mechanical properties but differ only what they consider as the maximum level acceptable for ductility purposes.

Hijikata:

Hijikata, like Namimura, is drawn to a high tension bolt (tensile strength above approximately 1275 N/mm^2 and thus within the range of Namimura) with resistance to delayed fracture (Title) and discloses a bolt made from a low-alloy steel rod of C: 0.3 – 0.6 wt% and more than 1.2 wt% of Si as essential components that is blueing-treated

(Abstract) at 300 – 350 °C (p. 9, para 3) to ensure that the strength of the threads are equal to that of the flat parts to obtain a stronger bolt.

Stefayne:

Stefayne, drawn to a process for the bluing of steel surfaces, teaches that steel surfaces are blued to form a blue-colored oxide surface and to impart corrosion resistance (col. 1, lines 25-37). Bluing is performed between 305 and 360 °C (col. 2, lines 35-45). Claim 1 discloses forming colored oxides on steel surfaces by allowing the part to be blued to come in contact with the hot vapors. The part to be blued is in thermal equilibrium with the reflux vapors and is thus in the temperature range of 305 and 360 °C (col. 4, lines 70-75).

Regarding claims 1 and 15, Namimura discloses a high-strength bolt with a tensile strength in the claimed range, excellent resistance to delayed fracture resistance, having a base steel composition overlapping each and every claimed range of C, Si, Mn, P, S, Al, Cr, Co, Ni, Cu, Mo, V, Nb, Ti, W, and Fe, and having a microstructure with greater than 80 area% pearlite and remainder (< 20 area% pro-eutectoid ferrite, free cementite, bainite, and martensite).

It would have been obvious to one of ordinary skill in high-strength bolt production, at the time of the invention, to subject Namimura's bolt to a bluing treatment in the claimed range of 100 – 500°C as Koike (a substantially similar bolt by any measure of composition and manufacture) taught that bluing in the overlapping range of 100 - 400 °C increases the strength, proof stress ratio, and relaxation resistance of the bolt (para 0020).

Alternatively, it would have been obvious to one of ordinary skill in high-strength bolt production, at the time of the invention, to subject Namimura's bolt to a bluing treatment in the claimed range of 100 – 500°C as Hijikata taught that bluing treatment at 300 – 350 °C is applied as the last step in the production of a substantially similar high-strength bolt with a tensile strength of greater than 1200 N/mm^2 (Abstract and p. 4, col. 2, para 4) to ensure that the strength of the threads are equal to that of the flat parts to obtain a stronger bolt.

Again, alternatively, it would have been obvious to one of ordinary skill in high-strength bolt production, at the time of the invention, to subject Namimura's bolt to a bluing treatment in the claimed range of 100 – 500°C as Stefayne taught that bluing imparts corrosion resistance (col. 1, lines 25-37) and a blue-colored oxide film and that the process may be performed with vapors at between 305 – 360 °C, thus overlapping the claimed temperature range.

The cited prior art, despite teaching overlapping ranges of composition, and bluing processing temperature, is silent as to the precise endpoints of these ranges.

However, it would have been obvious to one of ordinary skill in high-strength bolt production, at the time of the invention, to select any portion of the claimed ranges of alloying composition and bluing temperature, including the claimed ranges, from the overlapping ranges disclosed in Namimura (all but bluing temperature), Koike (bluing temperature), Hijakata (bluing temperature), and Stefayne (bluing temperature) because these references find that the prior art bolts in the entire disclosed ranges have a suitable utility and the normal desire of scientists or artisans to improve upon what is

already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). From MPEP § 2144.05: In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

With respect to the claimed high strength bolt being "superior in delayed fracture resistance and relaxation resistance", Namimura teaches (Abstract and claim 1) that his bolt has excellent resistance to delayed fracture resistance and one of ordinary skill in the art would reasonably expect the cited prior bolt of Namimura in view of any one of the cited secondary references to similarly possess superior relaxation resistance in view of Namimura's provision of a substantially similar bolt in terms of base alloy composition and microstructure and manufactured by a substantially similar manufacturing process including wire drawing, warm heading instead of cold heading (see following paragraph), and bluing (suggested by the secondary references), see MPEP 2113.

With respect to the bolt being "...prepared by: wire-drawing,...cold heading", although Namimura does not specifically teach that his bolt was formed by cold heading, however the determination of patentability is based on the product itself and does not depend on its method of production unless the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product. If the product in the product-by-process claim is the same as or obvious from a product of

the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

Cold-heading does not impart any additional structure (as compared to warm heading) to the claims beyond the alloy composition and microstructure already present and thus the prior art of Namimura does not teach away from the claimed product and instead reads on the claimed product as explained above.

Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. *In re Marosi,* 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983)

With respect to "…bluing treatment is done…to form a solid solution of Si in the ferrite", one of ordinary skill in the art would have reasonably expected the final product of the high-strength bolt to have a solid solution of Si in the ferrite as Namimura taught that Si dissolves in ferrite, thereby demonstrating remarkable solid-solution strengthening (para 0018).

Regarding claims 2-14 and 16-18, Namimura teaches steel compositions with alloying additions of Co, Ni, Cu, Mo, V, Nb, Ti, W, B, and Fe that fall in the instantly claimed ranges as shown in the comparative table above. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that there the

general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch and MPEP 2144.05, above.

With respect to claim 13, Koike and Hijikata teach bluing at temperatures overlapping those of the instantly claimed range of 200 – 300 °C and thus render the claim obvious as when general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch and MPEP 2144.05

While Stefayne teaches a temperature range of 305 – 360 °C that is above the claimed temperature range, the instant claim is directed to a final product of a bolt and it is not clear how the instantly claim high-strength bolt would have any different result in terms of distinct structural differences resulting from use of a lower bluing temperature that would distinguish the bolt over Namimura's bolt with bluing applied in the temperature range of Stefayne.

(10) Response to Argument

Appellants assert (p. 4, para 2) that the "Si content and the required bluing treatments are critical elements and are neither taught nor suggested by the applied art."

In response, the examiner disagrees as Namimura discloses Si as being present in a range overlapping that required by the instant claims and teaches that addition of Si or Co is effective in restraining the precipitation of pro-eutectoid cementite (para 0017),

improves the hardenability of the steel wire (precursor used to form the bolt), and acts as a deoxidizer and solid-solution strengthener (para 0018).

With respect to the required bluing treatments, while Namimura is silent as to bluing treatments, each of Koike (para 0020), Hijikata (p. 9, para 3), and Stefayne (col. 1, lines 25-37) disclose bluing treatments and beneficial effects that result from conducting bluing treatment on bolts.

Appellants assert (p. 4, para 3) that the cited prior art does not teach or suggest that the relaxation resistance of the required bluing treatment in enhanced due to Si being solid-solubilized.

In response, the Examiner disagrees in that one of ordinary skill in the art would have reasonably expected the final product of the high-strength bolt to have a solid solution of Si in the ferrite as Namimura taught that Si dissolves in ferrite, thereby demonstrating remarkable solid-solution strengthening (para 0018).

Appellants assert (p. 5, para 1) that Namimura does not teach or suggest a bluing treatment and because of this, the relaxation resistance of the bolt in not improved.

In response, this is not persuasive because the secondary references of Koike, Hijikata, and Stefayne were used to correct this deficiency and one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Appellants assert:

I. (p. 5, para 2) that Namimura teaches that the pearlite area is preferably 100% which means that Si would not be in solid solution in ferrite as ferrite would be 0 wt%

II. (p. 5, para 3) that Namimura prefers Si to be less than 1 wt%, both of which would lead to inferior bolts, and

III. (p. 5, para 4) that Namimura teaches away from a steel containing more than 0.5 wt% Cr (the instant claims require 0.5**1** – 2.5 wt% Cr).

In response, these assertions are not persuasive because Namimura specifically recognizes that Si forms a solid solution in ferrite (para 0018), discloses Si as being present to up to 2 wt% (para 0018), discloses Cr present as 1 wt% or less (para 0020), and disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. *In re Susi,* 440 F.2d 442, 169 USPQ 423 (CCPA 1971), see MPP 2123, section II.

Appellants assert (p. 6, para 1) that Koike teaches away from cold heading when the Si content is greater than 0.5 wt% and that excessive Si content is likely to lower the ductility as well as the cold headability of the steel wire. Furthermore, Appellants assert (p. 6, para 2) that Namimura and Koike are not properly combinable as Koike is limited to cold forging and teaches away from warm forging and Namimura teaches away from cold forging.

In response, these assertions are not persuasive because the question of whether Koike teaches away from cold forging is not relevant to the determination of patentability in the instant product claims because there is no evidence that warm forging vs. cold forging results in a different final microstructure. As to whether

Namimura and Koike are properly combinable, while the proposed modification cannot render the prior art unsatisfactory for its intended purpose (MPEP 2143.01, section V or change the principle of operation of a reference (MPEP 2143.01, section VI), the proposed modification of Namimura is the provision of a bluing treatment which would be expected to increase the bolt strength and improve the proof stress ratio and relaxation resistance (para 0020) of a substantially similar (in terms of strength, composition, and microstructure) high strength bolt. It is not seen how this proposed modification would amount to a change in the principle of operation of Namimura or render Namimura unsatisfactory for its intended purpose (providing a high strength bolt).

Appellants assert (p. 6, para 3) that Koike, like Namimura, teaches that the pearlite area is preferably 100% which means that Si would not be in solid solution in ferrite as ferrite would be 0 wt%.

In response, this is not persuasive because Koike specifically recognizes that Si forms a solid solution in ferrite (para 0026) and disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. *In re Susi,* 440 F.2d 442, 169 USPQ 423 (CCPA 1971), see MPP 2123, section II.

Appellants assert (7, para 1) that Koike teaches away from steels containing more than 0.5 wt% Cr.

In response, this is not persuasive because where the teachings of two or more prior art references conflict, the examiner must weigh the power of each reference to

suggest solutions to one of ordinary skill in the art, considering the degree to which one reference might accurately discredit another. *In re Young*, 927 F.2d 588, 18 USPQ2d 1089 (Fed. Cir. 1991). Furthermore, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure (interpreted as meaning all ranges are in agreement) of the primary reference.... Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981) – MPEP 2145, III.

Namimura is used as the primary reference and has an overlapping range of Cr, preferably less than 0.5 wt% (para 0020), but differs from Koike in that it considers 1.0 wt% to be the maximum allowable content instead of 0.5 wt% as Koike does. Namimura and Koike are substantially similar invention in teaching high-strength bolts of substantially similar composition (see second comparative table on p. 4-5) and microstructure. Weighing the suggestive power of Namimura against Koike, Namimura is more suggestive in that it discloses a broader range of Cr and Si compared to Koike while Koike does not even have a coherent teaching away of a negative result upon addition of "too much" Cr. Koike only teaches that bolt strength increase upon addition of Cr and Co "cannot be improved any further" (para 0035).

Appellants assert (p. 7, para 3) that Hijikata teaches away from combination with Namimura because of divergent carbon contents in the two references. In response, Namimura discloses a carbon content of 0.5 – 1 as being suitable for bolt production (para 0016), while Hijikata discloses a carbon content of 0.3 to 0.6 wt% (p. 5, second to

last paragraph). Both references have an overlapping carbon content as compared to the instantly claimed range of 0.5 – 1 wt%. Furthermore, where the teachings of two or more prior art references conflict, the examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art, considering the degree to which one reference might accurately discredit another. *In re Young*, 927 F.2d 588, 18 USPQ2d 1089 (Fed. Cir. 1991), in this case, Hijikata merely states that C above 0.6 is unnecessary to retain a tensile strength of 150 kgf/mm2 or more, while Namimura is more persuasive because of its breadth and clarity of consequences when C is out of range -- stating (para 0016) that an increase in C leads to an increase in strength, with at least 0.5 wt% necessary for a strength of 1200 N/mm2 or more (122.4 kgf/mm2 or more) and that more than 1.0 wt% C leads to deterioration in toughness, ductility, and wire-drawing processability.

Appellants assert (p. 8, para 1) that Namimura and Hijikata are not properly combinable because Hijikata has a different microstructure.

In response, the examiner disagrees in that Hijikata is silent as to the precise microstructure constitution by area or volume percent but is used for the disclosure regarding bluing treatment as applied to, comparing Namimura and Hijikata, similar bolts for the purposes of creating a stronger bolt (p. 9, para 3).

Appellants assert (p. 8, para 3) that Stefayne's bluing treatment is completely different from the instant bluing treatment as required by the instant product claims.

In response, this is not persuasive because Applicants have not shown how the bluing treatments are, in fact, different and this assertion is not persuasive as Stefayne plainly discloses bluing as 305 - 360 °C, which is within the claimed bluing treatment temperature range.

Furthermore, even if Stefayne's bluing treatment is different, Applicants would have to demonstrate a nonobvious, patentable distinction in the final products as a result of the bluing treatment.

Appellants Assert (p. 8, para 4 to p. 9 para 1) that Stefayne does not disclose the required minimum amounts of Cr or Si the presence of ferrite, or the importance or significance of forming the solid solution in the ferrite. Thus, the benefits of the present invention would not be obtained because critical features are lacking in the combination of Namimura and Stefayne.

In response, the examiner disagrees in that Namimura that asserted deficiencies of Namimura in terms of required Si content, Cr content, and required ferrite are not actually deficiencies.

As stated above, Namimura discloses Si as being present in a range overlapping that required by the instant claims and teaches that addition of Si or Co is effective in restraining the precipitation of pro-eutectoid cementite (para 0017), improves the hardenability of the steel wire (precursor used to form the bolt), and acts as a deoxidizer and solid-solution strengthener (para 0018) and discloses Cr present as 1 wt% or less (para 0020).

(11) Related Proceedings Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Mark L. Shevin/

Conferees:

/ Roy King/

Supervisory Patent Examiner, Art Unit 1733

/Gregory L Mills/

Supervisory Patent Examiner, Art Unit 1700

November 22nd, 2010
AU 1733

10-591,475